May 20, 2022

Missouri Department of Natural Resources
Stephen Hall
Director, Air Pollution Control Program

Environmental Protection Agency
Amy Algoe-Eakin
Branch Chief – Air Permitting and Standards

Missouri Department of Natural Resources
Richard Swartz

Environmental Protection Agency
Gustavo Queiroz, PE

Environmental Protection Agency
David Hansen

Re: BCP Ingredients
Written Follow-Up Report – April 8, 2022 - Ethylene Oxide Release

To Whom It May Concern:

On April 8, 2022, BCP Ingredients ("BCP") notified the National Response Center ("NRC"), Missouri State Emergency Response Commission ("SERC") and the Local Emergency Planning Commission ("LEPC") at or around 1:45 p.m. of a release of ethylene oxide at the BCP facility. BCP immediately commenced an investigation and provided follow-up verbal notifications to the agencies the afternoon of April 8, 2022. At that time, BCP indicated that approximately 1,290 pounds of Ethylene Oxide was released during railcar unloading.

With this letter, BCP supplements its prior verbal notification and submits its written follow-up report in accordance with 40 CFR 355.40.

Section 355.40(b) requirements

(1) Actions taken to respond and contain the release. BCP stopped the release as soon as it became aware of it. BCP used air monitors before going into the area and confirmed there were no detections of ethylene oxide before additional measures were taken. BCP also immediately undertook an incident investigation, the results of which are summarized below.

(2) Any known or anticipated acute or chronic health risks associated with the release. None. Because of wind directions, no exposure to employees or the community was anticipated. In addition, when employees were in the area of the release, they donned full personal protective equipment.

(3) Where appropriate, advice regarding medical attention necessary for exposed individuals. None.

Incident Summary

On or about 08 April 2022, an operator from BCP started the unloading procedure to transfer Ethylene Oxide (EtO) from a rail tank car spotted at the north loading platform (known as #1 or

T9) to the EtO storage tanks. No anomalies were noted at this time. It appears the operator did not check the conditions of T9, though it was observed by at least one (1) employee that it was dawn and lighting in the area may have made it difficult to see the small amount of the release from the hose at T9A.

Unloading operations are typically observed by video review of the car being unloaded. Icing and discoloration were discovered at ~13:30 by video of the loading station. Because T9A was not in use at the time, the icing and discoloration were believed to be a result of a leak. At this time the operator made immediate notification to supervisors and BCP management was notified. T9A was completely blocked and isolated to safely allow the complete unloading of the railcar spotted at T9 which was determined to be the safest action. A BCP team also went to the area to investigate.

The team donned appropriate PPE. PID monitors and LEL detectors were brought to the site to measure EtO concentrations. Due to the quick evaporation of the ice and EtO, concentrations were not detectable. An estimated 30 gallons (garden hose for 3-4 minutes) was used to dissipate the frost as per the indicated actions of the "Ethylene oxide Manual" third edition.

As the area was determined safe, an initial investigation was started. The following as found conditions existed for T9A:

- Hose end valve was in the closed position and showed signs of having leaked through and the hose was not capped.
- EOV01 and EOV04 (upstream block valves) were found in the open position
- The local EtO detectors had indicated alarm status.

An estimation of lost product indicated that the release was greater than the 10-pound threshold and required notification to the National Response Center (NRC). The NRC was notified at approximately 1:45 p.m. The NRC offered assistance if needed but it was indicated containment was complete and further assistance was not necessary. The NRC notified other regulatory agencies of the report. BCP also notified the LEPC and Missouri Emergency Response Commission.

With the facility shut down and containment indicating a safe mode, the site manager made arrangements to form a Root Cause Failure Analysis (RCFA) team to complete a detailed and thorough investigation. The team was diverse and included Production members and operators, engineering and maintenance, HSE personnel and all site leadership. The investigation commenced at ~9:00am Saturday 9 April 2022 in the BCP Conference room. The Apollo RCFA tool was used and the following documents as evidence:

- P&ID *"Ethylene Oxide Unloading" V-34-EORAIL* Revision 2
- P&ID *"Ethylene Oxide Storage" V34EO* Revision 1
- Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F

In addition, the operator who was doing the unloading at the time of the event participated to provide perspective into the events of the day.

The team using the Apollo software commenced to develop a cause-and-effect chart of the event and then look for evidence to substantiate the causes. The team identified a number of interim actions that were corrected before the process was re-started on April 12, 2022. Longer-term items were also identified for evaluation and/or implementation moving forward.

Investigation Findings

1. The hose end valve was found to be defective, and the hose was not capped. The cap on the hose was not installed as per Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F. The cap will be reinstalled in accordance with this procedure.

2. Valves EOV01 and EOV04 were in the open position. These valves according to procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F should have been in the closed position. A review of the procedure and observations by the production operator indicated the procedure was not easily understood as written, the accompanying checklist did not require a validation of position, and field valve identification was missing or hard to discern.

3. The 3-way valve used to line up the proper platform/unloading station to the EtO transfer pump PMM014 was defective allowing the pressurization of both platforms at once. This was confirmed during leak pressure testing by the team and subsequent removal and bench testing that was documented with video. This leak along with the hose end valve failure were key components resulting in the event.

4. Continuous monitoring pursuant to Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F, did not appear to be effective as the camera was focused on T9 unloading the platform not in use at the time (instead of T9A).

5. The use of two (2) persons as required by Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F, was not followed. Other activities were being performed simultaneously.

6. Local gas detection was working and correctly monitored the event but was not functioning to activate alarms and shutdowns.

7. Automation for the "Unipro" automated valve closure devices was found to be not functioning

8. Training and qualification of operators to do unloading procedures should be improved. Even with the equipment failures, the event may have been prevented or mitigated by proper SOP implementation.

Corrective Actions

The corrective actions were determined to prevent a recurrence were identified including identified causal factors. They were broken into two (2) groups. "Immediate/Interim" actions

were completed prior to a restart, and "longer Term" actions that will improve the process going forward and can be completed after startup.

Immediate/Interim: These items were completed by April 11:

- 3-Way valve to be replaced and tested prior to start.
- Hose End valve to be replaced in accordance with Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F prior to start.
- Valves to be relabeled prior to start
- Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision F./Checklist to be revised prior to start
- Training on new Procedure B-4000 *"Ethylene Oxide Rail Car Unloading"* Revision /Checklist and requalification of each operator prior to assignment to unloading activities
- PLC connection and operational validation of all alarms, shutdowns, and actuators prior to start
- Manpower alignment prior to start to assure continuous monitoring and two (2) person availability
- "Mini" PHA of unloading procedures completed prior to start including any high priority action items.
- Pressure test unloading systems prior to start.
- Management of Change (MOC) complete and signed prior to start.

Long-Term: A number of long-term actions were also identified and are being implemented and/or evaluated by BCP, including:

- Identify all needed adapters for "Unipro" closures and procure. Until all adapters are available production will work with suppliers to assure only cars accepted for unloading will meet current adapters.
- Update all EtO P&IDs to indicate actual installation and assign identification numbers as appropriate.
- Operator requalification protocols to be developed and implemented to ensure training continues to be understood.
- Consideration of enhanced video monitoring needs.
- Procurement of end caps for hoses.
- Consideration of different hoses for unloading operations.
- Additional assurance audits of all procedural/checklist use for unloading.
- Strategy and protocol for periodic pressure testing of unloading equipment.

If you have additional questions, please do not hesitate to contact me at (845) 637-6042. Thank you.

Sincerely,

Shawn P. Thomas, PE
EHS Director
Balchem Corporation